

respective inlet ports. The outlets (30 in Davis, 28 in Applicant's case) are remote from the projections (23 in Davis, 44 in Applicant's case).

More particularly, Applicant respectfully invites the Examiner to consider the following points.

Claim 1 as amended 28 September 2007.

5 Claim 1 as amended by the previous submission preceding the current office action reads:

1. A downhole tool for collecting and retrieving junk from a well bore, the tool comprising:

a cylindrical body attachable in a work string;

a multi-faceted surface comprising a plurality of projections arranged at an end of the body for contacting with and breaking up junk; and

10 a plurality of inlet ports through which the broken up junk passes into a trap for collection;

wherein each projection is located between adjacent inlet ports and wherein adjacent projections define channels therebetween which are shaped to direct the junk into the respective inlet ports.

15 Upon addition of reference numerals purely for ease of reference, the claim reads:

A downhole tool (10) for collecting and retrieving junk from a well bore, the tool comprising:

a cylindrical body (12) attachable in a work string;

a multi-faceted surface (42) comprising a plurality of projections (44) arranged at an end of the body for contacting with and breaking up junk; and

20 a plurality of inlet ports (40) through which the broken up junk passes into a trap for collection;

wherein each projection is located between adjacent inlet ports (40) and wherein adjacent projections define channels (46) therebetween which are shaped to direct the junk into the respective inlet ports (40).

Claim Rejections – 35 USC § 102

The Davis Reference

5 Considering, the first embodiment of Davis, there is described a downhole tool for drawing small milling debris into a combination milling and debris retrieval tool.

10 In order to place the Applicant's invention in context, it is notable to distinguish between "debris" that is small particles such as metal shavings, chips, twists, or curls, and cement or scale particles, and larger objects "junk" that represent broken parts of tools, or quick milled fragments (c.f. Davis column 1, lines 49 to 56, contrasted with Davis column 1, lines 57 to column 2, line 4).

Applicant's invention is capable of removing junk and debris from a well.

The Davis' proposal is adapted only for separating small cutting debris from fluid flow at the bottom hole assembly (BHA).

15 Davis' BHA clean-up tool is incapable of separating junk by development of sufficient flow by induced reverse circulation generated by fluid eductor nozzles (34). Junk would instead settle in the BHA in a typical downhole operation, or become balled-up in the region of the mill blade parts (23) in a lateral borehole.

20 Davis' proposal cannot be operated in a forward circulation mode without making parts redundant (e.g. high speed eductor jets, and re-configuring internal flow and arrangement of deflector plate and filter screen, at least).

The essence of Davis' teaching relies upon generating a reverse flow circulation whereby fluid is drawn into the ports (26).

25 Applicant's invention does not operate in this manner. Either on run-in, or upon normal flow circulation (forward circulation) during a clean up/out run, fluid is forced up the exterior of the tool, past the narrow throat section (52) and into the large inlet ports (40).

Notwithstanding the operational and configurational differences referred to above, Davis' small debris collector is not capable of entrapping junk even if, somehow, sufficient reverse flow pressure could be developed.

5 The configuration of the Davis milling blades (23) with respect to the intake slots (26), the latter being positioned below the blades, makes it impossible for the blades to define channels therebetween which are shaped to direct the junk into the respective inlet ports.

10 Examiner suggests that since the debris cannot pass through the Davis' blades, such must pass between them in order to go into the outlet. However superficially plausible this suggestion appears to be, close scrutiny of the Davis' proposal teaches that the debris is formed by milling surfaces ahead of the "blades", and cannot return to pass between the "blades" to reach the inlet slots (26). Conversely, reflecting upon the possibility of the debris returning upwards from the milling faces towards the external outlet 24, (nor yet the internal ports (30)): this is impossible to achieve. There is no way that the debris travelling in that direction could enter the outlet ports (24), nor become retained within the tool. Therefore, it is respectfully submitted that
15 the Examiner should set aside Davis and allow claim 1 without further amendment.

In contradistinction to Davis, Applicant's projections are located between adjacent inlet ports (40) and the adjacent projections define channels (46) therebetween which are shaped to direct the junk into the respective inlet ports.

Therefore, there are good and sound distinctions in the claimed subject matter.

20 The claimed arrangement means that Applicant's combined junk milling and removal tool passes out fluid and small debris via ports (28, 30, Fig.1), whilst broken up junk passes into a trap for collection.

Davis cannot realise this goal.

Davis and Claim 3

25 Considering Examiner's view with regard to claim 3, it is not apparent that a body, a sleeve and a filter screen are juxtaposed as claimed in claim 3. Davis contemplates a filter screen (32) located with a tubular body (16): no sleeve being apparent. Examiner is invited to withdraw this objection.

Davis and Claim 4

Again, the claim language reflects a structure that cannot be recognised in Davis' Figs. 1 & 2. Debris collection tube (28), contemplated as forming trap referred to by Examiner, does not lie within an annular space between a body and a sleeve as required by the specific claim

5 language of claim 4.

Davis and Claim 5

It is asserted that Davis teaches ports that have a flow path parallel to the longitudinal axis of the tool (Fig. 2). Applicant most respectfully disagrees. Ports 26 or 30 are in contemplation and neither satisfies the claim language. Both sets of ports, i.e. slots 26, and ports 30 open

10 transversely with respect to the longitudinal axis of the tool, and thus have flow paths that are not aligned parallel to the longitudinal axis of the tool.

Davis and Claim 7

Applicant earnestly believes that the Examiner is mistaken in asserting that Davis shows a throat (10) in an arrangement as claimed. Davis actually shows a drive plug sub (10) that is

15 remote from the milling tool. Thus any diameter restriction there is completely devoid of functionality in relation to the blades (23) and intake slots (26). Davis teaches nothing in relation to provision of a throat being located adjacent to the projections and having a diameter narrower than a diameter of the sleeve.

Davis and Claim 8

20 Whilst Davis includes an axial bore, Davis fails to teach the combination of features of the invention as claimed in Claim 8 as dependent upon the aforescussed claims.

Davis and Claim 9

Applicant respectfully submits that the milling elements (23) of Davis are in proximity to the intake slots (26) and that there is no throat adjacent thereto in contrast to claimed invention.

25 Davis and Claim 10

Whereas Davis provides a milling tool on a work string, Examiner is reminded that the configuration of the inlet slots (26), blades (23), and annular debris settlement area (56) are such that the settlement area is remote from the inlet slots, as contrasted with the trap (31) within external sleeve (26) that is adjacent to inlet port 40.

- 5 Furthermore, Davis is concerned with a method for separating small cutting debris from fluid flow in a BHA, and for capturing the small debris within the housing of the separator tool. Davis is not concerned with breaking up large pieces of junk but rather smaller debris.

- 10 Davis does not describe directing the broken-up “debris” towards the inlet ports along channels defined between adjacent projections and collecting the “debris” through the inlet ports and storing the “debris” in a trap adjacent the inlet ports. It is recalled that the annular debris collector is remote from the inlet slots, and not adjacent thereto as per Applicant’s invention.

Davis and Claim 11

- 15 Davis, in column 5 lines, 38 to 44, describes forming an area of low pressure or vacuum to draw fluid up through the intake ports (26), which is not “jetting” as claimed in the combination of claims 10 and 11. Thus, the passive entrainment of small cuttings or debris as described in the cited passage, fails to teach the method claimed by the Applicant.

Claim Rejections – 35 USC § 103

Examiner cites Davis (above) in view of reference US 5 682 950 (Bjornstad) against claims 2, 6 and 12.

- 20 Davis and claim 2, considering Bjornstad

Foremost, it is important to recognise that Davis fails to teach the features of claim 1, as discussed above in relation to rebuttal of Davis in consideration of Claim Rejections – 35 USC § 102.

Claim 2 is dependent from claim 1, and includes the innovative features thereof.

- 25 Bjornstad describes a milling tool or grinder with a wear resistant coating material e.g. tungsten carbide. This teaching of the properties of tungsten carbide does not lead the ordinary artisan to arrive at the combination of claimed subject matter of claims 1 and 2.

Particularly, the Davis and Bjornstad combination fails to suggest a tool as claimed, especially in that wherein each projection is located between adjacent inlet ports and wherein adjacent projections define channels therebetween which are shaped to direct the junk into the respective inlet ports.

5 Davis and claims 6 & 12, considering Bjornstad

Examiner calls attention to the disclosure in Bjornstad of prior art referring to use of valves. This citation necessitates a brief review of the actual teaching cited, namely of the respective references US 4 603 739, US 4 703 804, and US 4 838 354.

US 4 603 739:

- 10 This patent (Krug) concerns a clean-up tool using a wiper (not a milling tool) to clean the casing sides of a well bore hole. Fig.4 for example illustrates a trap for return circulation comprising first (160) and second (230) filters. Valve means (320) functions to permit fluid passage, but does not function as contemplated in the instant office action. In fact the filters retain and contain the debris, not the valves. The reference through Bjornstad to this Krug
15 disclosure does not support the point raised by the Examiner.

US 4 703 804:

- Stokes discloses in this patent debris removal and well gauging device, incorporating an anti-jamming frangible connection to a bridge plug. As the device is lowered into a well casing it encounters debris that will become funnelled into a cavity with openings adapted to pass fluid
20 but retain debris. This is not a milling tool and fails to refer to valve means as might be inferred from Bjornstad.

US 4 838 354:


- A down hole clean out method and tool system is disclosed by Jenkins in this patent. Pivoting expandable blades associated with a rotating drill bit adapted to pass through production tubing
25 to clear an obstruction zone are utilized to engage and clean the inner surfaces of the casing without cutting the casing. This reference also fails to teach a milling tool, or use thereof in conjunction with valve means as claimed.

Therefore, it appears that the Bjornstad is somewhat misleading in its recitation of the teachings of the prior art, at least in relation to valve use.

In the light of the foregoing explanations, Applicant respectfully invites the Examiner to reconsider the rejected claims and permit the application to proceed to allowance and issue of a patent.

Respectfully Submitted,

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C. Dean Domingue, Reg. No. 33,682
Longman Russo, APLC
Post Office Box 3408
Lafayette, Louisiana 70502-3408
Phone (337) 262.9000
Fax (337) 262.9001
Customer No. 29166